

SECTION 05 31 00 – STEEL ROOF AND FLOOR DECKING

PART 1 GENERAL

1.1 SUMMARY

A. SECTION INCLUDES

1. Roof Deck
2. Composite Floor Deck
3. Non-composite Form Deck
4. Non-composite Vented Form Deck

B. RELATED SECTIONS

1. Section 033000 "Cast-in-Place Concrete" for normal-weight and lightweight structural concrete fill over steel deck.
2. Section 035216 "Lightweight Insulating Concrete" for lightweight insulating concrete fill over steel deck.
3. Section 051200 "Structural Steel Framing" for shop- and field-welded shear connectors.
4. Section 055000 "Metal Fabrications" for framing deck openings with miscellaneous steel shapes.

C. REFERENCES

1. American National standards institute (ANSI):
 - a) ANSI/SDI-RD - Standard for Steel Roof Deck.
 - b) ANSI/SDI-C - Standard for Composite Steel Floor Deck.
2. American Welding Society (AWS):
 - a) AWS D1.3 - Structural Welding Code-Sheet Steel.
3. ASTM International (ASTM):
 - a) ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.
 - b) ASTM A 1008/A1008M - Standard Specification for Steel, Sheet, Cold-Rolled, Carbon, Structural, High-Strength Low-Alloy and High-Strength Low-Alloy with Improved Formability.
 - c) ASTM C1513 - Standard Specification for Steel Tapping Screws for Cold-Formed Steel Framing Connections.
 - d) ASTM E119 - Standard Test Methods for Fire Tests of Building Construction and Materials.
 - e) ASTM E329 - Standard Specification for Agencies Engaged in Construction Inspection, Testing, or Special Inspection.
4. FM Global (FM):
 - a) FM - Approval Guide, Building Materials.
 - b) FM 4451 - Approval Standard for Class 1 Insulated Steel Roof Decks.
5. Underwriters Laboratories (UL):
 - a) UL 263 Standard for Safety of Fire Tests of Building Construction Materials

1.2 SUBMITTALS

- A. Submit under provisions of Section 01 30 00 - Administrative Requirements.
- B. Product Data: For each type of decking specified, showing profile, gauge, dimensions, and finishes
- C. Shop Drawings: Include layout and types of deck panels, anchorage details, reinforcing

channels, pans, cut deck openings, special jointing, accessories, and attachments to other construction.

- D. Product Certificates: Include certification showing deck manufacturer's current certification with the Steel Deck Institute
- E. Test and Evaluation Reports: For tests performed by a qualified testing agency, indicating that each of the following complies with requirements:
 - 1. Power-actuated mechanical fasteners
- F. Field Quality Control Submittals:
 - 1. Field quality-control reports.
- G. LEED Submittals: Provide product data to document recycled content.

1.3 QUALITY ASSURANCE

- A. Manufacturer Qualifications: All primary products specified in this section shall be supplied by a single manufacturer with a minimum of five years' experience in the manufacture of steel deck.
 - 1. Manufacturer offering deck products must be a member of the Steel Deck Institute.
- B. Installer Qualifications: Minimum two years experience installing similar products.
- C. Welding Qualifications:
 - 1. Per AWS D1.1/D1.1M "Structural Welding Code - Sheet Steel."
 - 2. Per AWS D1.3/D1.3M "Structural Welding Code - Sheet Steel."
- D. FM Global Listing: provide steel roof deck evaluated by FM Approvals and listed in its "RoofNav" for Class 1 fire rating and **[Class 1-60]** **[Class 1-75]** **[Class 1-90]** windstorm ratings. Identify materials with FM Approvals Certification markings

1.4 DELIVERY, STORAGE, AND HANDLING

- A. Protect steel deck from corrosion, deformation, and other damage during delivery, storage, and handling.
- B. Store products in accordance with SDI MOC3. Stack steel deck on platforms or pallets and slope to provide drainage. Protect with a waterproof covering and ventilate to avoid condensation.

PART 2 PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS

- A. Approved Manufacturer: CSM Metal Deck located at 8660 Lambright Road Houston, TX 77075; Email: info@metaldecking.com; website: www.metaldecking.com
- B. Requests for substitutions will be considered in accordance with provisions of Section 01 60

00 - Product Requirements.

2.2 PERFORMANCE REQUIREMENTS

- A. AISI Specifications: Comply with calculated structural characteristics of steel deck in accordance with AISI's "North American Specification for the Design of Cold-Formed Steel Structural Members."
- B. Fire-Resistance Ratings: Comply with ASTM E119; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency
 - 1. Manufacturer's steel deck must be approved by UL and listed in the UL Fire Resistance Directory
- C. Recycled Content of Steel Products: Postconsumer recycled content plus one-half of preconsumer recycled content not less than **[25]** **<Insert value>** percent.

2.3 ROOF DECK

- A. Basis-of-Design Product: Subject to compliance with requirements, provide **CSM Metal Deck; [B-Deck] [N-Deck] [N-Deck Interlocking] [1" Roof Deck] [B-Deck Vented] [1" Roof Deck Vented]** or comparable product by one of the following:
 - 1. **<Insert other approved manufacturers' name>**
- B. Fabrication of Roof Deck: Provide deck type, gage, span condition, and panel length as indicated on drawings. Fabricate panels, without top-flange stiffening grooves, to comply with SDI and with the following:
 - 1. Galvanized-Steel Sheet: ASTM A653/A653M, Structural Steel (SS), **[Grade 33] [Grade 40] [Grade 80]**, with a **[G60] [G90]** zinc coating.
 - 2. Prime-Painted Steel Sheet: ASTM A1008/A1008M, Structural Steel (SS), Cold Rolled Full Hard, shop primed with manufacturer's standard baked-on, rust-inhibitive primer.
 - a) Color: Manufacturer's standard **[Gray] [White] [Gray top surface with white underside]**.
 - 3. Galvanized and Primed Steel Sheet: ASTM A653/A653M, Structural Steel (SS), **[Grade 33] [Grade 40] [Grade 80]**, with a **[G30] [G60]** zinc coating; cleaned, pretreated, and primed with manufacturer's standard baked-on, rust-inhibitive primer.
 - a) Color: Manufacturer's standard **[Gray] [White] [Gray top surface with white underside]**.
- C. Deck Profile: **[As indicated] [1.5B] [3N] [1.0RD]**
- D. Profile Depth: **[As indicated] [1 inch] [1-1/2 inches] [3 inches]**
- E. Design Uncoated-Steel Thickness: **[As indicated] [0.0179 inch] [0.0238 inch] [0.0295 inch] [0.0358 inch] [0.0474 inch] [0.0598 inch]**
- F. Span Condition: **[As indicated] [Simple span] [Double span] [Triple span or more]**.
- G. Side Laps: **[Overlapped] [Interlocking seam] [Overlapped or interlocking seam at Contractor's option]**.
- H. Hanger Tabs: Rolled-In Hanger Tabs

2.4 COMPOSITE FLOOR DECK

- A. Basis-of-Design Product: Subject to compliance with requirements, provide **CSM Metal Deck; 1 ½" Composite Deck, 2" Composite Deck, 3" Composite Deck** or comparable product by one of the following:
1. <Insert manufacturer's name>
- B. Fabrication of Composite Floor Deck: Fabricate panels, with integrally embossed or raised pattern ribs and interlocking side laps, to comply with SDI C, with the minimum section properties indicated, and with the following:
1. Galvanized-Steel Sheet: ASTM A653/A653M, Structural Steel (SS), **Grade 50**, with a **[G60] [G90]** zinc coating.
 2. Galvanized and Primed Steel Sheet: ASTM A653/A653M, Structural Steel (SS), Grade 50, **[G30] [G60]** zinc coating; with unpainted top surface and cleaned and pretreated bottom surface primed with manufacturer's standard **[gray] [white]** baked-on, rust-inhibitive primer.
 3. Profile Depth: **[1.5 inches] [2 inches] [3 inches]**
 4. Design Uncoated-Steel Thickness: **[As indicated] [0.0295 inch] [0.0358 inch] [0.0474 inch] [0.0598 inch]**
 5. Span Condition: **[As indicated] [Simple span] [Double span] [Triple span or more]**.
 6. Side Laps: **[Overlapped] [Interlocking seam] [Overlapped or interlocking seam at Contractor's option]**.

2.5 NONCOMPOSITE FORM DECK

- A. Basis-of-Design Product: Subject to compliance with requirements, provide **CSM Metal Deck; [9/16" Form Deck] [1" Form Deck] [1 ½" Form Deck]** or comparable product by one of the following:
1. <Insert manufacturer's name>
- B. Fabrication of Noncomposite Form Deck: Fabricate ribbed-steel sheet noncomposite deck panels used as a form to comply with SDI NC, with the minimum section properties indicated, and with the following:
1. Galvanized-Steel Sheet: ASTM A653/A653M, Structural Steel (SS), Grade 80, with a **[G60] [G90]** zinc coating.
 2. Galvanized- and Shop-Primed Steel Sheet: ASTM A653/A653M, Structural Steel (SS), Grade 80, with a **[G30] [G60]** zinc coating; cleaned, pretreated, and primed with manufacturer's standard baked-on, rust-inhibitive primer.
 - a) Color: **[Manufacturer's standard] [Gray] [White] [Gray top surface with white underside]**.
 3. Profile Depth: **[9/16"] [1"] [1 ½"]**
 4. Design Uncoated-Steel Thickness: **[As indicated] [0.0179 inch] [0.0238 inch] [0.0295 inch] [0.0358 inch] [0.0474 inch] [0.0598 inch]**
 5. Span Condition: **[As indicated] [Simple span] [Double span] [Triple span or more]**.
 6. Side Laps: **Overlapped**.

2.6 NONCOMPOSITE VENTED FORM DECK

- A. Basis-of-Design Product: Subject to compliance with requirements, provide **CSM Metal Deck; [1"] [1 ½"] Vented Form Deck** or comparable product by one of the following:
1. <Insert manufacturer's name>
- B. Fabrication of Noncomposite Form Deck: Fabricate ribbed-steel sheet noncomposite deck

panels used as a form to comply with SDI NC, with the minimum section properties indicated, and with the following:

1. Galvanized-Steel Sheet: ASTM A653/A653M, Structural Steel (SS), Grade 80, with a **[G60] [G90]** zinc coating.
2. Galvanized- and Shop-Primed Steel Sheet: ASTM A653/A653M, Structural Steel (SS), Grade 80, with a **[G30] [G60]** zinc coating; cleaned, pretreated, and primed with manufacturer's standard baked-on, rust-inhibitive primer.
 - a) Color: **[Manufacturer's standard] [Gray] [White] [Gray top surface with white underside]**.
3. Profile Depth: **[1"] [1 ½"]**
4. Design Uncoated-Steel Thickness: [As indicated] **[0.0179 inch] [0.0238 inch] [0.0295 inch] [0.0358 inch] [0.0474 inch] [0.0598 inch]**
5. Span Condition: **[As indicated] [Simple span] [Double span] [Triple span or more]**.
6. Side Laps: **Overlapped**.

2.7 ACCESSORIES

- A. Provide manufacturer's standard accessory materials for deck that comply with requirements indicated.
- B. Mechanical Fasteners: Corrosion-resistant, low-velocity, power-actuated or pneumatically driven carbon-steel fasteners; or self-drilling, self-threading screws.
- C. Side-Lap Fasteners: Corrosion-resistant, hexagonal washer head; self-drilling, carbon-steel screws, No.**[10] [12]** minimum diameter.
- D. Flexible Closure Strips: Vulcanized, closed-cell, synthetic rubber.
- E. Miscellaneous Sheet Metal Deck Accessories: Steel sheet of same material gauge and finish as deck; of profile indicated or required for application.
- F. Pour Stops and Girder Fillers: Steel sheet, minimum yield strength of 33ksi, of same material and finish as deck, and of thickness and profile **[indicated] [recommended by SDI standards for overhang and slab depth]**.
- G. Column Closures, End Closures, Z-Closures, and Cover Plates: Steel sheet, of same material, finish, and thickness as deck unless otherwise indicated.
- H. Weld Washers: Uncoated steel sheet, shaped to fit deck rib, **[0.0598 inch] [0.0747 inch]** thick, with factory-punched hole of 3/8-inch minimum diameter.
- I. Shear Stud Connectors: ASTM A108, AISI C-1015 through C-1020, headed-stud type, cold-finished carbon steel; AWS D1.1/D1.1M, Type B.
- J. Flat Sump Plates: Single-piece steel sheet, 0.0747 inch thick, of same material and finish as deck. For drains, cut holes in the field.
- K. Recessed Sump Pans: Single-piece steel sheet, 0.0747 inch thick, of same material and finish as deck, with 3 inch wide flanges and **[level] [sloped]** recessed pans of 1 ½" inch minimum depth. For drains, cut holes in the field.
- L. Galvanizing Repair Paint: [ASTM A780/A780M] [SSPC-Paint 20 or MIL-P-21035B, with dry film containing a minimum of 94 percent zinc dust by weight].

- M. Repair Paint: Manufacturer's standard rust-inhibitive primer of same color as primer.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Examine supporting frame and field conditions for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION, GENERAL

- A. Install deck panels and accessories in accordance with SDI C, SDI NC, and SDI RD, as applicable; manufacturer's written instructions; and requirements in this Section.
- B. Install temporary shoring before placing deck panels if required to meet deflection limitations.
- C. Locate deck bundles to prevent overloading of supporting members.
- D. Place deck panels on supporting frame and adjust to final position with ends accurately aligned and bearing on supporting frame before being permanently fastened. Do not stretch or contract side-lap interlocks.
- E. Place deck panels flat and square and fasten to supporting frame without warp or deflection.
- F. Cut and neatly fit deck panels and accessories around openings and other work projecting through or adjacent to deck.
- G. Provide additional reinforcement and closure pieces at openings as required for strength, continuity of deck, and support of other work.
- H. Comply with AWS requirements and procedures for manual shielded metal arc welding, appearance and quality of welds, and methods used for correcting welding work.
- I. Mechanical fasteners may be used in lieu of welding to fasten deck. Locate mechanical fasteners and install in accordance with deck manufacturer's written instructions.
- J. Shear Stud Connectors: Prepare steel surfaces as recommended by manufacturer of shear connectors. Weld using end welding of headed-stud shear connectors in accordance with AWS D1.1/D1.1M and manufacturer's written instructions.

3.3 INSTALLATION OF ROOF DECK

- A. Fasten roof-deck panels to steel supporting members by arc spot (puddle) welds of the surface diameter indicated or arc seam welds with an equal perimeter that is not less than 1-1/2 inches long, and as follows:
 1. Weld Diameter: **[5/8 inch] [3/4 inch]**, nominal.
 2. Weld Spacing: Weld edge and interior ribs of deck units with a minimum of two welds per deck unit at each support. Space welds **[18 inches apart, maximum] [12 inches apart in Zone 1 and 6 inches apart in Zones 2 and 3, based on roof-area definitions in FM Global Loss Prevention Data Sheet 1-28] [as indicated]**.
 3. Weld Washers: Install weld washers at each weld location.

- B. Side-Lap and Perimeter Edge Fastening: Fasten side laps and perimeter edges of panels between supports, at intervals not exceeding the lesser of one-half of the span or **[18 inches] [36 inches]**, and as follows:
 1. Mechanically fasten with self-drilling, No. **[10] [12]** diameter or larger, carbon-steel screws.
 2. Mechanically clinch or button punch.
 3. Fasten with a minimum of 1-1/2-inch- long welds.
- C. End Bearing: Install deck ends over supporting frame with a minimum end bearing of 1-1/2 inches, with end joints as follows:
 1. End Joints: [Lapped **2 inches** minimum] [Butted] [Lapped **2 inches** minimum or butted at Contractor's option].
- D. Roof Sump Pans and Sump Plates: Install over openings provided in roof deck and **[weld] [mechanically fasten]** flanges to top of deck. Space **[welds] [mechanical fasteners]** not more than 12 inches apart with at least one **[weld] [fastener]** at each corner.
 1. Install reinforcing channels or zees in ribs to span between supports and **[weld] [or] [mechanically fasten]**.
- E. Miscellaneous Roof-Deck Accessories: Install ridge and valley plates, finish strips, end closures, and reinforcing channels in accordance with deck manufacturer's written instructions. **[Weld] [or] [mechanically fasten]** to substrate to provide a complete deck installation.
 1. Weld cover plates at changes in direction of roof-deck panels unless otherwise indicated.
- F. Flexible Closure Strips: Install flexible closure strips over partitions, walls, and where indicated. Install with adhesive in accordance with manufacturer's written instructions to ensure complete closure.
- G. Sound-Absorbing Insulation: Installation into topside ribs of deck as specified in **<Insert Section number and title>**.

3.4 REPAIR

- A. Galvanizing Repairs: Prepare and repair damaged galvanized coatings on both surfaces of deck with galvanized repair paint in accordance with ASTM A780/A780M and manufacturer's written instructions.
- B. Repair Painting:
 1. Wire brush and clean rust spots, welds, and abraded areas on **[both surfaces] [top surface]** of prime-painted deck immediately after installation, and apply repair paint.
 2. Apply repair paint, of same color as adjacent shop-primed deck, to bottom surfaces of deck exposed to view.
 3. Wire brushing, cleaning, and repair painting of bottom deck surfaces are included in Section 099113 "Exterior Painting" and Section 099123 "Interior Painting."
 4. Wire brushing, cleaning, and repair painting of rust spots, welds, and abraded areas of both deck surfaces are included in Section 099113 "Exterior Painting" and Section 099123 "Interior Painting."

3.5 FIELD QUALITY CONTROL

- A. Testing Agency: **[Owner will engage] [Engage]** a qualified testing agency to perform tests

and inspections.

B. Tests and Inspections:

1. Special inspections and qualification of welding special inspectors for cold-formed steel floor and roof deck in accordance with quality-assurance inspection requirements of SDI QA/QC.
 - a) Field welds will be subject to inspection
2. Steel decking will be considered defective if it does not pass tests and inspections.
3. Shear Stud Connectors: In addition to visual inspection, test and inspect field-welded shear connectors in accordance with requirements in AWS D1.1/D1.1M for stud welding and as follows:
 - a) Perform bend tests if visual inspections reveal either a less-than-continuous 360-degree flash or welding repairs to any shear connector.
 - b) Conduct tests in accordance with requirements in AWS D1.1/D1.1M on additional shear connectors if weld fracture occurs on shear connectors that are already tested.

C. Prepare test and inspection reports.

END OF SECTION 05 31 00